

Overview

This volume is a collection of peer-reviewed papers based on presentations made at the Second Symposium on Composite Materials: Fatigue and Fracture, held in Cincinnati, Ohio, 27-28 April 1987. This is the second such symposium sponsored by ASTM Committee D-30 on High Modulus Fibers and their Composites and devoted to the topics of fatigue and fracture (the first was held in Dallas/Ft. Worth, Texas, 24-25 October 1984 and is published as *Composite Materials Fatigue and Fracture, ASTM STP 907*).

Although this is only the second ASTM symposium dedicated to the important topics of fatigue and fracture of composite materials, nearly 40% of the papers contained in previous ASTM STP volumes of Committee D-30 symposia deal with these two topics. This represents over 250 papers in the last 20 years. Despite all the work conducted, the topics of fatigue and fracture of composite materials remain as challenges to researchers and practitioners alike.

In order to use these materials in demanding structural applications, it is necessary to fully understand the intricacies of their failure process. As we have gained knowledge and experience over the years, our emphasis has shifted from empirical correlative techniques, such as the S-N diagram, to characterizing and modelling the specifics of the damage growth which occur prior to final failure. This is the motivation for the sections on Fatigue and Damage Growth and on Models and Analysis. New fracture phenomena, such as delamination, have been discovered and great effort placed on their study. Nearly half the papers in this volume deal with various aspects of delamination, and one entire section is devoted to this topic. Finally, we have begun to apply our knowledge of fracture and fatigue of composite materials to structures made of these materials. This is demonstrated in the section entitled Structural Aspects.

Both researchers and designers in the field of composite materials will find, in this volume, important and useful information on state of the art work concerning fatigue and fracture of composite materials. The great majority of papers deal with composite systems of thermosetting epoxies. However, some attention is paid to the more recent thermoplastic systems. This volume thus contains information of interest to those employing the traditional epoxy systems as well as those utilizing the emerging thermoplastic systems.

The hard work of the authors, reviewers, and session chairmen enabled 26 of the 27 papers presented at the symposium to be included in this volume. Special thanks are extended to these session chairmen who aided in the important review process: Lee Gause, Steve Johnson, Larry Rehfield, and Sam Garbo. Grateful appreciation is also extended to the authors, reviewers, and the ASTM staff for making this volume an excellent and important contribution to the composites literature.

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